Project Summary

Title: Study of Dual Mixed Summer Green Manure Cover Crops on Quantitative and Qualitative Traits of Wheat

Project Code: 000226-015-03-03-2

Institution: Seed and Plant Improvement Institute, Agricultural Research, Education and Extension Organization (AREEO), Ministry of Agriculture Jihad, Iran

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Duration: July 2021 – December 2023 (2.5 years)

Location: Karaj, Alborz Province

Objective

This research aimed to evaluate the impact of dual mixed cropping of summer green manure cover crops on the yield and quality traits of irrigated wheat. The goal was to identify optimal crop combinations and seed ratios that enhance wheat performance while promoting sustainable and resilient agroecosystems.

Methodology

- **Design:** Split-plot in randomized complete block design with 28 treatments and 3 replications (84 plots total).
- **Treatments:**
  - 7 monoculture cover crops: oat, cluster-flowered vetch, berseem clover, spring canola, spring safflower, foxtail millet, mung bean
  - 19 dual mixed combinations (e.g., oat–safflower, mung–clover, canola–millet, etc.)
  - 2 control treatments: fallow–wheat and manure–wheat
- **Seed Ratios:**
  - 30:70 or 70:30 for dominant vs. secondary crop
  - 50:50 for balanced combinations
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- **Measured Traits:**
  - Wheat grain yield, straw yield, biomass, yield components
  - Bread quality indices

    - Economic profitability
- **Analysis Tools:** SPSS and Genstat for variance analysis and mean comparisons

Key Findings

- **Agronomic Performance:**
    - Eight dual crop combinations showed positive cumulative effects on wheat yield and quality.
    - Recommended combinations include:
        - Canola–millet
        - Mung–clover
        - Millet–clover
        - Oat–safflower
        - Safflower–clover
        - Safflower–millet
        - Millet–mung
        - Safflower–mung
- **Economic Evaluation:**
    - The safflower–millet treatment yielded the highest wheat output (9,615 kg/ha) and net profit (990 million IRR/ha).
    - Return on investment:
        - 126% profit per IRR spent
        - 69.3% profit per IRR earned from wheat sales

Significance

This study demonstrates the potential of dual mixed green manure cropping systems to improve wheat productivity, soil health, and economic returns. It supports conservation agriculture and offers practical strategies for sustainable crop rotation in semi-arid regions.